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The following Address having been read to this Royal Society, the President and Council of the same, being desirous to encourage, as much as may be, an Undertaking so useful, desire the several Members thereof, and their learned and ingenious Correspondents, to communicate their Observations, directed to their Secretaries, in Crane-Court, Fleet-Street.

CVII. *An Attempt to point out, in a concise manner, the Advantages which will accrue from a periodic Review of the Variation of the magnetic Needle, throughout the known World; addressed to this Royal Society by William Mountaine and James Dodson, Fellows of the said Society, and requesting their Contribution thereto, by communicating such Observations concerning it, as they have lately made, or can procure from their Correspondents in foreign Parts.*

London, March 20, 1755.

Read March 20,
1755.

ABOUT the year 1700, the justly celebrated Doctor Edmund Halley having collected together a great number of observations, made on the variation of the needle, in many parts of the world, drew (on a mercator CHART) certain lines, shewing the quantity of that variation, in those parts of the world, over the representation of which those lines were drawn; but as the quantity

of this variation is in a perpetual state of fluctuation, in (perhaps) every part of the world, it had been so much changed in the space of forty years, or thereabouts, that (when the writers of this paper endeavoured about the year 1744, to draw thereon, other lines to answer the purposes above-mentioned) they found that those laid down by Doctor Halley were grown intirely useless; and that a system of such lines, or something analogous thereto, should be performed once in every ten or twelve years at least, in order to answer the purposes intended, by that sagacious gentleman.

In the reconstruction of them, the writers received the assistance of the commissioners of the navy, and of the directors of the East-India and African companies, having leave to peruse the journals of those mariners, which were under the direction of each respective body; From these, and a few private communications, they were enabled to draw the proper lines over the most frequented seas, and to make some attempts toward doing the same in those least so; A copy of the CHART, thus again rendered useful, they presented to this Royal Society, with an account of the methods used in performing the same.

Although the most beneficial use of these lines belongs to the sea, yet if they could be extended over the land likewise, the advantages arising would more than compensate the trouble, as will appear by taking a short view of each.

And first, the use of these lines at sea may be considered either as common to the art of navigating in all large bodies of water; or as particular in some such: the general use being that of steering the true
course

course designed, and finding the ship's true place, as near as may be, by what the mariners call the dead-reckoning.

The particular uses will be best explained by examples; for instance, in the southern parts of the great Atlantic ocean, beginning with the coast of Brazil and Patagonia, and proceeding to the south of the Cape of Good Hope into the Indian ocean, as far as the common tracks of our East-India ships extend, the variation lines have appeared to be, for the most part, directed northward and southward; whence, in most places of that great body of waters, if the latitude and variation be found by celestial observations, the longitude will be obtained by the lines on the chart; the great usefulness of which has been attested to the writers, by many persons who have, successfully to themselves, practically applied the last constructed CHART, to correct their dead-reckoning on that long passage.

Indeed, where the variation lines run nearly eastward and westward, as has appeared in the Atlantic ocean, from the west coast of Europe to the east coast of North America, no assistance toward obtaining the longitude can be derived from them; but as it frequently happens, within those limits, that meridian observations, for determining the latitude, cannot be obtained, especially about Newfoundland; then, if a good observation of the variation can be taken, at any time of the day the latitude may be nearly ascertained by the lines on the CHART.

Secondly, The advantage that will arise by extending the variation lines over the land, as well as sea, will be the confirmation of those drawn over the
waters;

waters; the continuation of which, from sea to sea, will be thereby conspicuous, and we shall be enabled to judge better of their nature, properties and causes; and, if the same can be extended over all the parts of the known world, the eye will be presented, at one view, with the different degrees of attraction, with which all the parts of this great magnet are endued, at the time when such lines are drawn; This the writers would have attempted to have done, in the year 1744, if they could have procured a sufficient number of observations for that purpose; but although they frequently advertised their request, in the public papers, no assistance was thereby obtained.

As the writers have by experience found, that the proper period for re-examining the state of the variation is now at hand, without which the above-mentioned valuable advantages of the CHART will be lost to the mariner; they have determined to collect and compare all the observations that can be procured by them, in the space of a year from this time, or so long after as the return of the East-India ships then next following; if such delay should become necessary, by the arising of any doubt in consequence of such comparison; and then to publish the result of their process, in such a manner as shall seem most convenient.

Several of the learned and ingenious have endeavoured to account for this phenomenon of the variation of the magnetic-needle, and the continual mutation thereof; whence different methods of computation have been proposed, whereby they have endeavoured to determine what the quantity of the
variation

variation will (according to their several hypotheses) be at any given place and time: The above proposition, therefore, will (if carried into execution) bring these severally to the test, and enable the judicious either to approve or reject them; the writers being determined (as was their former plan) to publish nothing which shall not be warranted by the real observations, which shall come into their hands, and shall leave the application thereof (as to each hypothesis) to others: if any of them should be so far confirmed, by this examination and comparison, as to give just ground for a calculation, their labour will be at an end; but if not, they humbly recommend the continuance of such a periodic operation, as they now propose to undertake, being the only means of attaining such a desirable event, and of supplying the defect till it can be obtained.

To whom then can they so properly apply, as to the Royal Society of London, for assistance, in a work of so much consequence to trade and navigation, and from whence so valuable an addition to natural knowledge may possibly accrue: It has been the peculiar honour of the many illustrious members of this body, that they have deduced their knowledge from experiments, and not from hypotheses; and (as that is the method now proposed) the writers of this paper humbly desire of this Society, as a body, and of each individual that composes it, to communicate to them such observations of the variation as they have already made within a few years last past, or shall hereafter make, before the 25th of March 1756, either by sea or land; and (as all mankind
are

are equally interested in this research) that they will endeavour to procure the like favour from their several correspondents in foreign countries: They beg leave to assure the Society, and its particular members, that they shall receive a grateful acknowledgement of this favour, granted; and an early information of any thing relating hereto, which the writers shall conceive to be worthy their attention.

The END of V O L. XLVIII.

Additions